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(56) Documents cited
GB 2092346 A EP 0215203 A2 EP 0200454 A2
EP 0123109 A2 EP 0109581 A2

(58) Field of search
UK CL (Edition K) G4H HSD HSE HSU HSV HTAL HTAR HTAS HTAT
INT CL[5] G06F, G09G

(54) Display processing system

(57) First, a table composed of a plurality of cells is initialized. At this time, the positional data, the size data and the medium of each cell are stored in a table cell management data memory 7 for each cell. Subsequently, editing activity in each cell is performed, which is performed individually for each cell according to the management data of each cell stored in the table cell management data memory 7. Furthermore, when editing activity is performed for each cell, a data processing portion of a corresponding medium in a multimedia processing portion 5 is selectively enabled. In this way, not only characters but also graphic symbols, images and so forth can be displayed in each cell.

FIG.1

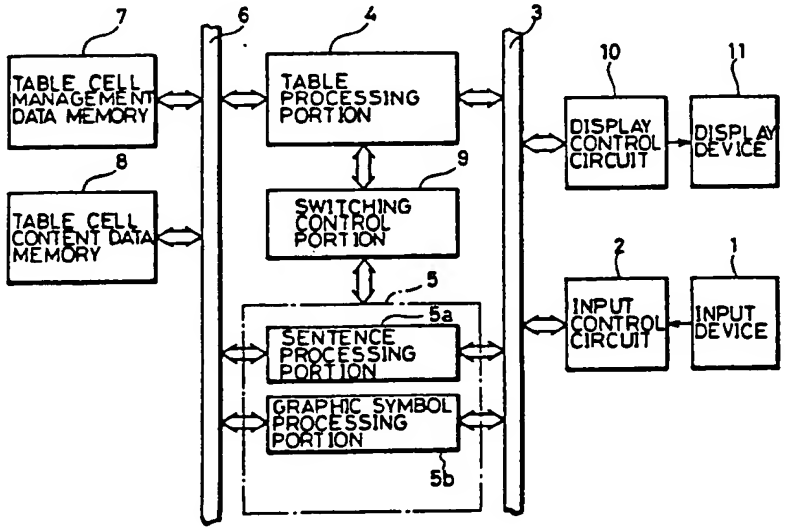

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FIG.2

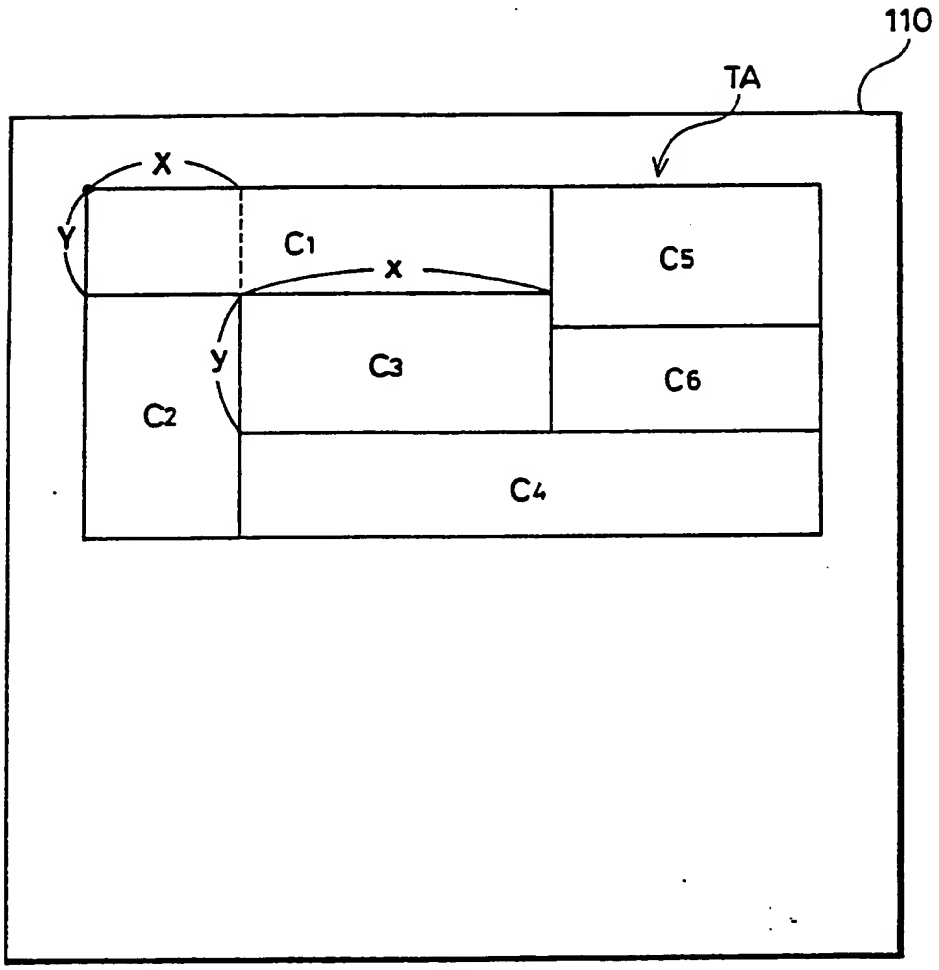

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FIG.5

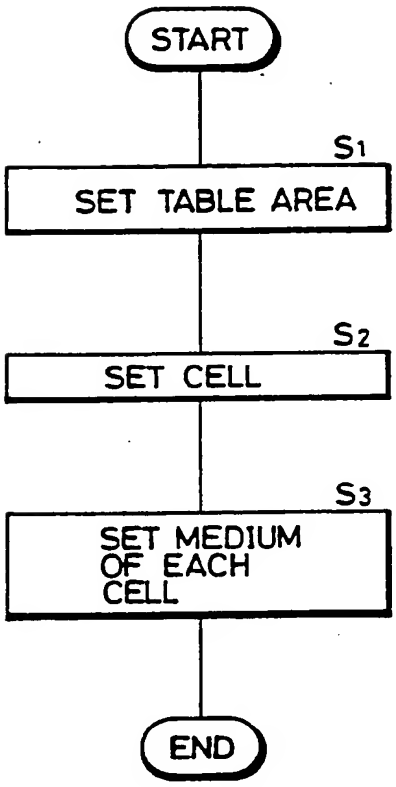

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FIG.7

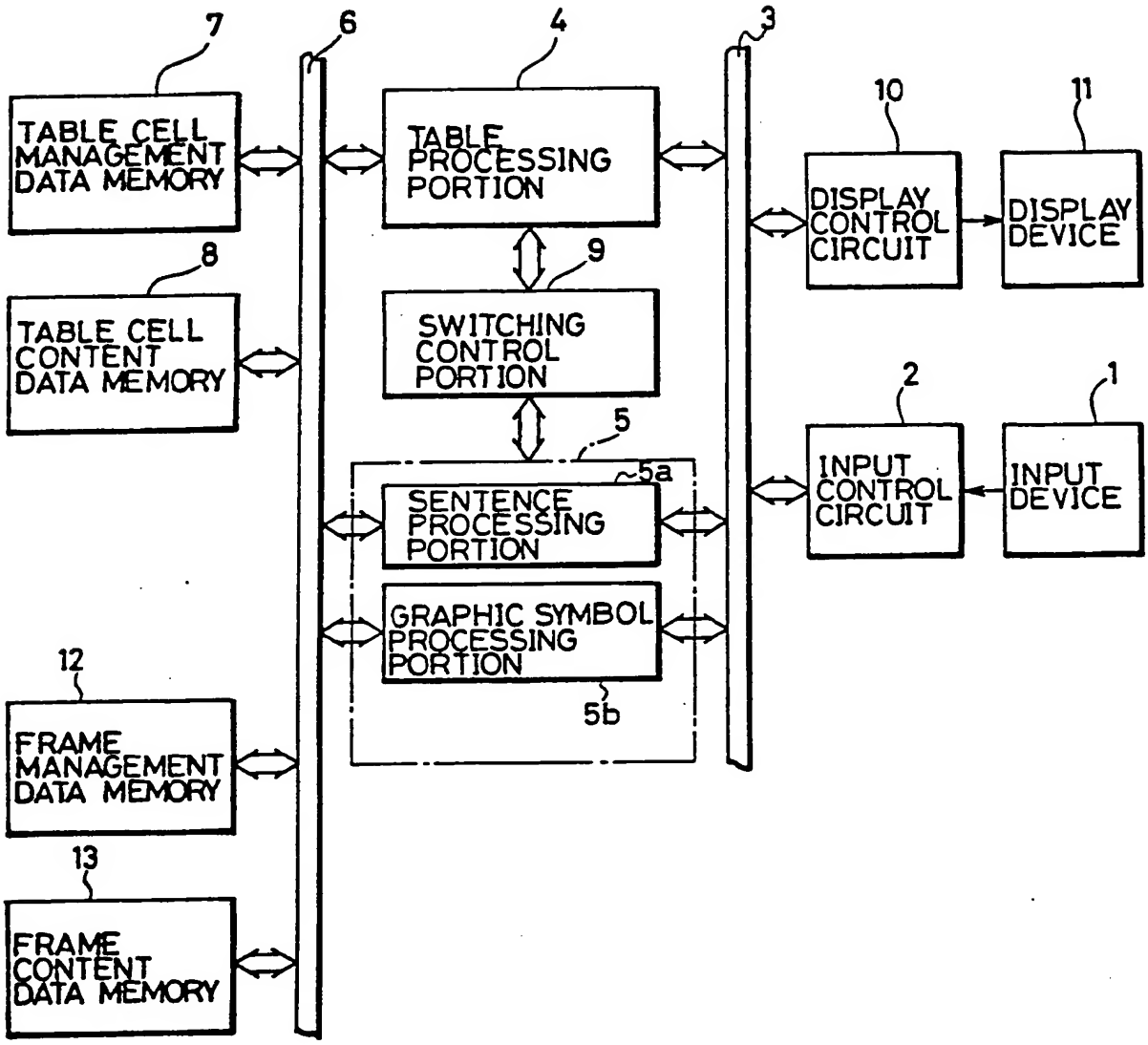
7
6
4
3
TABLE CELL MANAGEMENT DATA MEMORY
TABLE PROCESSING PORTION
10
11
DISPLAY CONTROL CIRCUIT
DISPLAY DEVICE
8
9
TABLE CELL CONTENT DATA MEMORY
SWITCHING CONTROL PORTION
2
1
5
5a
INPUT CONTROL CIRCUIT
INPUT DEVICE
SENTENCE PROCESSING PORTION
GRAPHIC SYMBOL PROCESSING PORTION
5b
12
FRAME MANAGEMENT DATA MEMORY
13
FRAME CONTENT DATA MEMORY

FIG.9

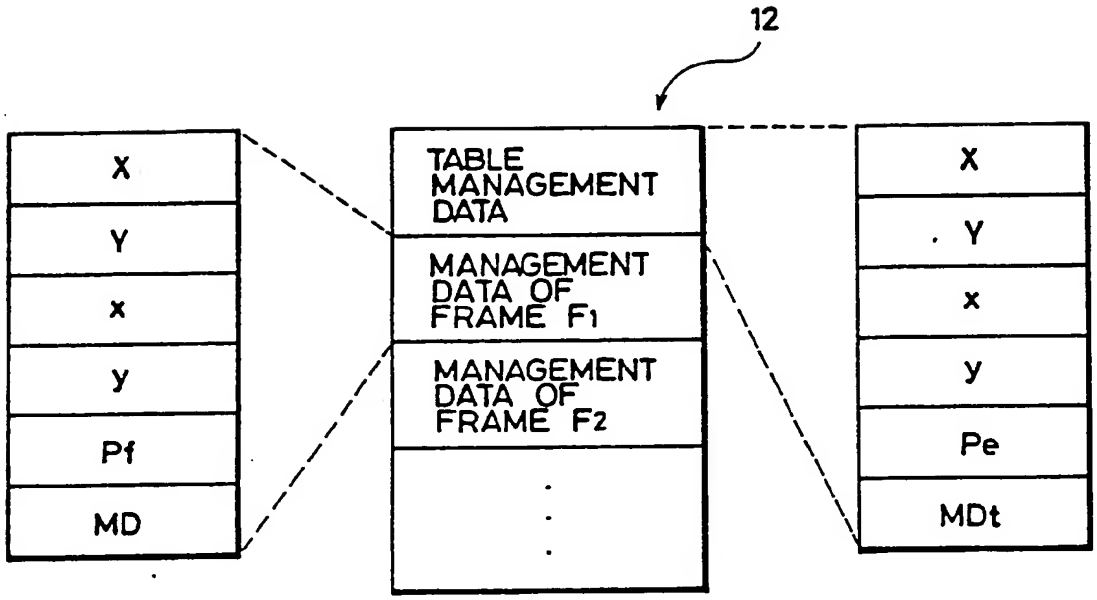

FIG.10

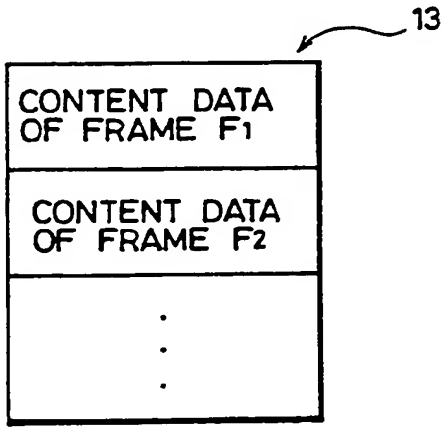

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FIG.12

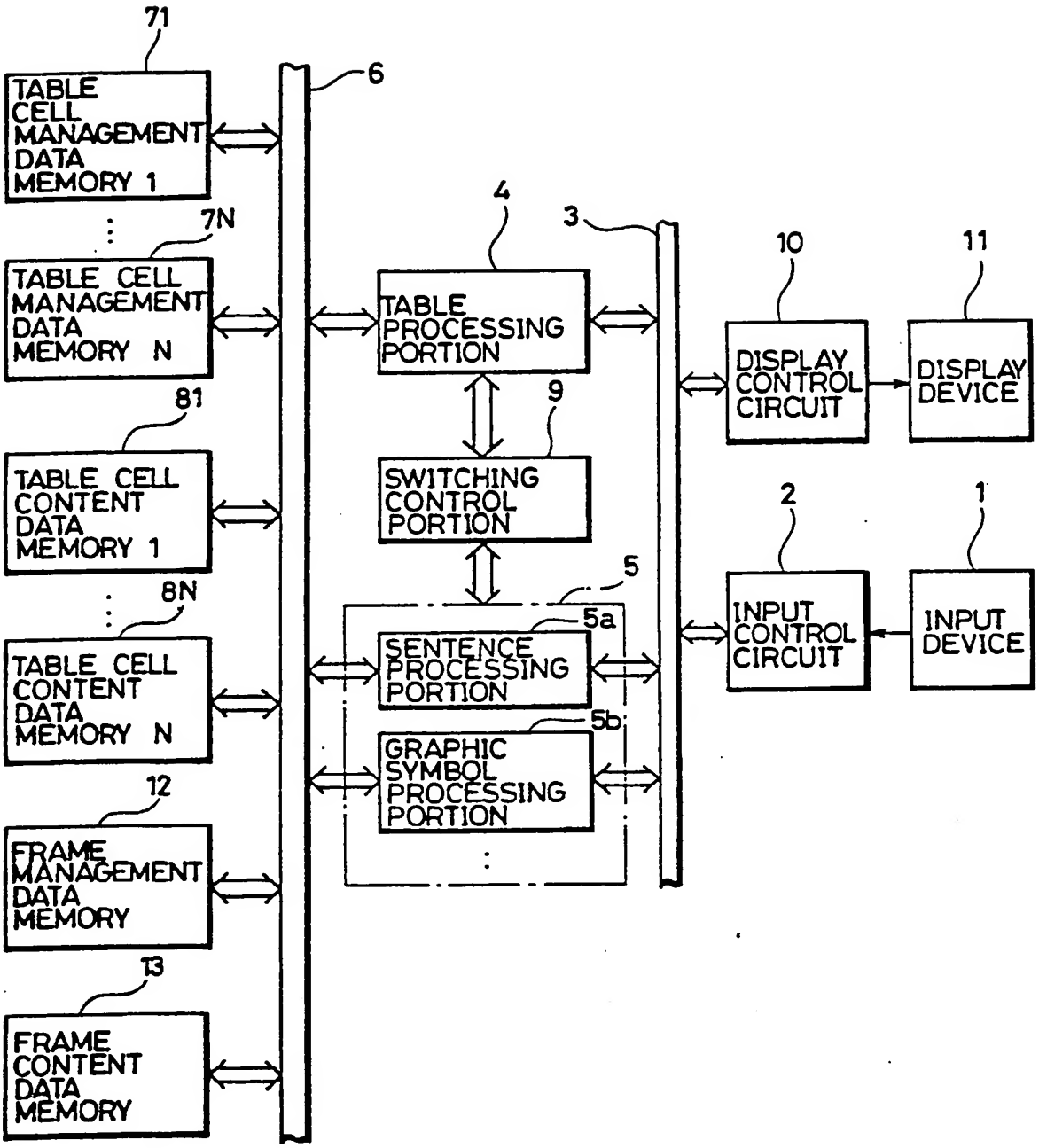

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FIG.14

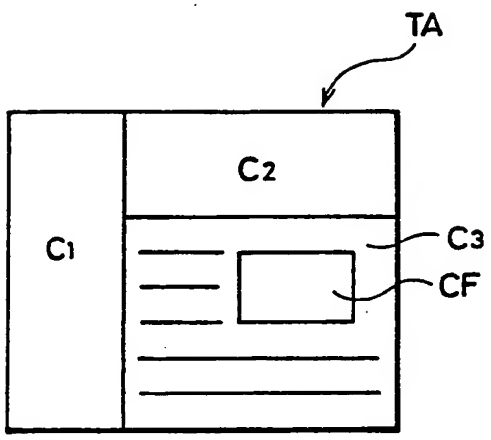

FIG.15

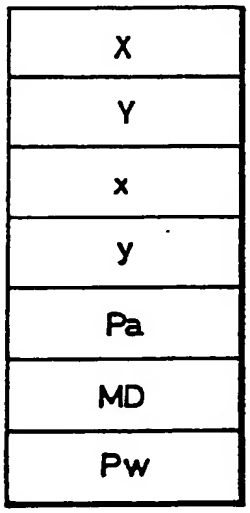

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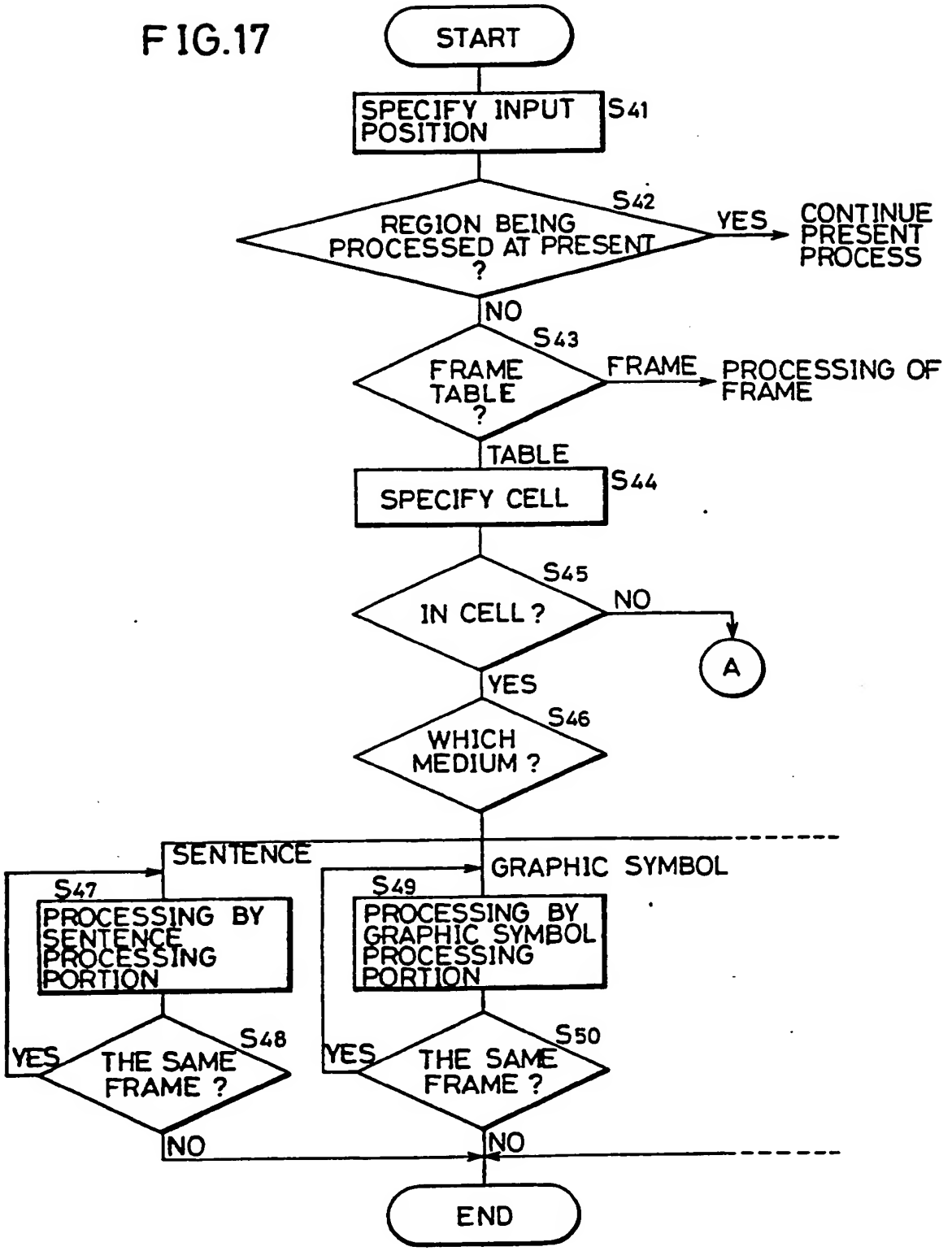
FIG.17



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TITLE OF THE INVENTION

Display Processing System

BACKGROUND OF THE INVENTION

Field of the Invention

The present Invention relates to a display processing system, and more particularly, to a system for efficiently forming and displaying tables in an information processor such as a personal computer and a word processor.

DESCRIPTION OF THE BACKGROUND ART

Some of conventional information processors such as personal computers and word processors have a tabulating function.

However, in the tabulating function of conventional information processors, only characters could be displayed in each cell (a region divided by ruled lines, which is 1 unit constituting a table) of a table. Accordingly, the tabulating function of conventional information processors had a program of inferior versatile expressing ability.

Also, the tabulating function of conventional information processors handles an entire table as a sentence unit and could not perform editing individually for each cell. Therefore, they have had a problem that an operator must input data in consideration of arrangement and size of each cell not to disturb the character string between the respective cells, which makes operator's

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means has a plurality of data processing portions for processing data input from the input means, each of which data processing portions is made to process data expressed in an expressing form different from each other. The selectively enabling means selectively enables a data processing portion of a corresponding expressing form in the multimedia processing means according to management data of a corresponding cell stored in the management data storing means when one of cells is specified by the input means. The cell content data storing means stores the data processed by the multimedia processing means for each cell.

According to the present invention, contents of a table is managed for each cell unit, and data is processed for each cell and individually stored. Accordingly, without influence on other cells, input activity and edit activity can be independently performed for each cell unit. As a result, the operator does not have to input data in consideration of positional relationship and size of the respective cells, so that the tabulating activity of the operator can be considerably reduced as compared to a conventional case.

Furthermore, according to the present invention, data processing of plural kinds of expressing forms can be performed by the multimedia processing means, so that

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7.

Fig. 9 is a diagram showing the data structure of the frame management data memory in Fig. 7.

Fig. 10 is a diagram showing the data structure of the frame content data memory in Fig. 7.

Fig. 11 is a flow chart for describing operation of the embodiment shown in Fig. 7.

Fig. 12 is a block diagram showing the configuration of still another embodiment of the present invention.

Fig. 13 is a block diagram showing the configuration of yet another embodiment of the present invention.

Fig. 14 is a diagram showing one example of a table formed by the embodiment shown in Fig. 13.

Fig. 15 is a diagram showing one data structure of a cell management data stored for each cell in the table cell management data memory in Fig. 13.

Figs. 16-18 are flow charts for describing operation of the embodiment shown in Fig. 13.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

First, referring to Fig. 1, the configuration of one embodiment of the present invention will be described. An input device 1 including key boards, a mouse and so forth inputs data necessary for display processing. Here, the data necessary for display processing includes coordinate data, display content data, input positioning data and so

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multimedia processing portion 5 for each cell. A switching control portion 9 is provided between table processing portion 4 and multimedia processing portion 5. This switching control portion 9 is for switching a control right of the system between table processing portion 4 and multimedia processing portion 5. Display control circuit 10 is also connected to input/output data bus 3. This display control circuit 10 display-drives a display device 11 according to the display data such as a formed table. Thus, data such as a table is displayed on display device 11.

Fig. 2 is a diagram showing one example of a table formed by the embodiment shown in Fig. 1. The table TA displayed in a display screen 110 in display device 11 has six cells C1-C6, for example. Data can be displayed in various expressing forms (e.g. characters, graphic symbols) in the respective cells C1-C6.

Fig. 3 is a diagram showing the data structure of table cell management data memory 7 in Fig. 1. As shown in the figure, in table cell management data memory 7, management data for each cell is stored. The management data for one cell includes the coordinate data X, Y showing position of that cell, the data x, y showing size of that cell, pointer data Pa showing head address of an area corresponding to that cell in table cell content data

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device 1, and table processing portion 4 finds positional data and size data of each cell according to this positioning data. Then, table processing portion 4 secures data storing area of each cell in table cell management data memory 7 and also stores positional data and size data of a cell corresponding to each data storing area. Next, in the step S3, it is set in which medium or expressing form the contents of each cell should be expressed. That is, each cell is individually specified by input device 1 and media specifying data in the respective cells are inputted. Table processing portion 4 sets media flag MD (refer to Fig. 3) of each cell in table cell management data memory 7 according to the media specifying data inputted from input device 1. Thus, initialization operation of a table is completed.

Next, referring to Fig. 6, operation of forming contents to be displayed in each cell in a table will be described. First, the operator has to decide which cell's contents are to be formed. To this end, the operator specifies a cell to be an object of activity by input device 1. In response to this, table processing portion 4 specifies which cell has been specified according to the cell specifying data from input device 1 in the step S11. Also, table processing portion 4 reads corresponding cell's positional data, size data and media flag MD from

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(steps S14, S16). As the data processing for one cell is completed, it advances to the step S17, switching control portion 9 determines whether another cell in the same table has been specified or not. When another cell in the same table is specified, the control right of the system is moved to table processing portion 4 and operations after the step S11 are repeated again. A series of operations as described are performed for each cell. At this time, the data processed by each data processing portion 5a, 5b, ... in multimedia processing portion 5 are stored in table cell content data memory 8 for each cell. When processing of the content data of all the cells or given cells is completed, the activity of forming a table is completed.

In parallel with operations shown in Figs. 5 and 6, corresponding contents are displayed in display device 11. Accordingly, the operator can proceed the activity of forming a table while watching the displayed contents on display device 11.

In some conventional information processors, not only sentences but also graphic symbols and image are displayed in display regions other than a table in a display device. Such conventional information processors have a multimedia processing portion as well as the embodiment shown in Fig. 1. However, the multimedia

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processed in multimedia processing portion 5. Other configurations are similar to those in the embodiment shown in Fig. 1, and the same reference numerals are assigned to the corresponding portions and the description is not repeated here.

Fig. 8 is a diagram showing one example of display contents for one page formed by the embodiment shown in Fig. 7. In the figure, a table TA, a frame F1, and a frame F2 are displayed on a display screen 110 of a display device. Furthermore, in other regions of display screen 110, a sentence SE is displayed.

Fig. 9 is a diagram showing the data structure of the frame management data memory 12 in Fig. 7. In the figure, frame management data memory 12 stores management data of each frame for each frame. The management data of each frame, as shown in the left-hand side of Fig. 9, includes coordinate data X, Y showing a position of each frame, the data x, y showing size of each frame, pointer data Pf showing head address of a area in which the content data of a corresponding frame is stored in frame content data memory 13, and media flag MD specifying a medium of each frame. Frame management data memory 12 further stores the table management data. That is, frame management data memory 12 manages a table as a kind of frame. The table management data stored in frame management data memory 12,

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processing portion 4 or each data processing portion 5a, 5b, ... in multimedia processing portion 5 performing processing at present, and a determination is made as to if the specified position is a region currently being processed or not (the step S21). When the same region as the region currently processed is specified, the current process is continued. On the other hand, when a region different from the region currently processed is specified, the control right of the system is moved from display processing portion 4 or multimedia processing portion 5 to switching control portion 9. Switching control portion 9 determines which frame in one page is specified by the position specified by input device 1 referring to the data in frame management data memory 12 shown in Fig. 9 in the step S23. Subsequently, advancing to the step S24, switching control portion 9 determines a medium or a type of that frame according to the media flag MD or Mdt included in the management data of a frame specified in the step S23, to shifts the control right of the system to the corresponding processing portion. At this time, if not ordinary frame F1, F2, ••• but a table TA is specified, in the step S25, contents of a cell in a table is formed. That is, in the step S25, operation similar to that shown in the flow chart of Fig. 6 is performed to form the content of each cell in the table.

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portion 4. Other configurations are same as those of the embodiment shown in Fig. 7, and the same reference numerals are assigned to the corresponding portions and the description thereof is not repeated here.

Fig. 14 is a diagram showing one example of a table formed by the embodiment shown in Fig. 13. In the figure, the table TA includes three cells C1-C3, for example. Furthermore, in the cell C3, a frame CF is formed. That is to say, in the embodiment shown in Fig. 13, a frame can be further formed in a cell constituting a table. Furthermore, in a embodiment shown in Fig. 13, a region surrounded by the frame CF and other regions can be individually edited in the cell C3 shown in Fig. 14, for example.

Fig. 15 is a diagram showing the data structure about one cell of the table cell management data stored in table cell management data memory 7 in Fig. 13. As shown in the figure, as compared with the table cell management data shown in Fig. 3, the pointer data Pw is added to the table cell management data in the embodiment of Fig. 13. This pointer data Pw is data indicating a head address of an area in which a corresponding frame management data in frame management data memory 12 is stored (as for the data structure, refer to Fig. 9). By resetting the value of this pointer data Pw at 0 or the like, it is known that

area of a corresponding frame management data in frame management data memory 12 at the pointer data Pw of a corresponding cell in table cell management data memory 7.

Next, referring to Fig. 17, operation for specifying a frame in order to form the contents of the frame formed in a cell of a table will be described. First, as an input position is designated from input device 1, the input position designating data is taken into processing portion 4 or 5 or 14 which is currently performing process in the step S41. The processing portion which captured the input position designating data makes a determination as to if the designated input position is in or out of the region being processed in the step S42. If the designated input position exists in the region which is now processed, the current process is continued. On the other hand, if the designated input position exists out of the region which is now processed, the control right of the system shifts to switching control portion 9 from the above processing portion. Accordingly, switching control portion 9 makes a determination as to whether the designated input position is in the frame or in the table in the step S43. If the designated input position is in the frame, the data process concerning a frame is performed. On the other hand, if the designated input position is in a table, switching control position 9

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corresponding medium in multimedia processing portion 5 according to the determination result in the step S46. Thus, a data processing portion of the medium corresponding to the frame being specified processes the data of the frame inputted from input device 1 (steps S47-S50). The frame content data processed at this time by multimedia processing portion 5 is stored in frame content data memory 13 for each frame.

Next, referring to Fig. 18, operation of forming contents of a region outside of a frame in a cell having a frame will be described. As described above, the operation of Fig. 18 is carried out when an input position which is specified at that time is determined to be a region out of a frame of a cell having a frame in the step S45 of Fig. 17. First, the control right of the system is shifted from table processing portion 4 to switching control portion 9. Accordingly, switching control portion 9 reads media flag MD of a corresponding cell from table cell management data memory 7 to determine in the step S51 at which medium the specified cell is set. Subsequently, switching control portion 9 reads pointer data Pw of a corresponding cell from table cell management data memory 7 and transfers the pointer data Pw to a data processing portion in multimedia processing portion 5 corresponding to the result of a determination in the step S51 (steps

CLAIMS:

1. A display processing system for displaying at least a table composed of a plurality of cells, comprising:

input means for inputting data necessary for display process;

management data forming means for forming management data for each said cell according to the input data from said input means;

cell management data storing means for storing said management data for each cell;

multimedia processing means having a plurality of data processing portions for processing the data provided from said input means, each of which data processing portions being structured to process data expressed in expressing forms different from each other; and

means for selectively enabling a data processing portion of a corresponding expressing form in said multimedia processing means according to management data of a corresponding cell stored in said management data storing means when any of said cells is specified by said input means; and

cell content data storing means for storing for each said cell the data processed by said multimedia processing

5. The display processing system according to claim 1, further comprising:

in-cell frame management data forming means for forming management data concerning a frame to be displayed in said cell according to the input data from said input means;

in-cell frame management data storing means for storing management data concerning a frame to be displayed in said cell;

means for selectively enabling a data processing portion of a corresponding expressing form in said multimedia processing means according to management data concerning a corresponding frame stored in said in-cell frame management data storing means when a frame in said cell is specified by said input means; and

frame content data storing means for storing the data processed by said multimedia processing means for each frame.

the accompanying drawings.

10. A display processing system substantially as hereinbefore described with reference to Figures 13 to 18 of the accompanying drawings.

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